ELEMENTAL COMPOSITION OF BODY PARTS OF *HOLOTHURIA TUBULOSA*

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Abstract
Trace and major elements found in body parts of *Holothuria tubulosa*, which is economical and environmental important sea cucumber species, was determined. Data were collected in winter season and given in average at findings.

Keywords: Trace elements, Dardanelles, Monitoring, Metals, Bio-accumulation

Introduction
Sea cucumbers are economically livings which can take a high proportion in daily diet in Asian countries. Alongwith this, sea cucumbers are carrying an important role in ecological balance [1]. They live in bed of seas and mostly consume debris and degrading biological components [2]. Sea beds are recognized as reservoir of most chemical pollutants much more than sea waters [3]. In this case sea cucumber is an important indicator organism which can directly show us the information of metal contamination of seas. *Holothuria tubulosa* is one of the most abundant economic sea cucumber species found in Turkey seas.This species are mainly caught by scuba in Aegean and Marmara Seas and exported to Asian countries. This study summarizes the elemental composition of sea cucumber which indicates safety of products and pollution level of Çanakkale Strait sediment.

Materials and Methods
Holothuria tubulosa species were collected by scuba up to 15 meters depth from Southern Coasts of Çanakkale Strait in February 2015. Samples were divided into three groups and their body wall and viscera separated as body parts. Body walls were directly weighted and blended for analysis. Viscera of sea cucumberswere first separated from their mud-sands found in their intestinal. Then washed viscera were weighted and homogenized for analysis. The element analysis was done according to method of EPA [4-5].

Results and Discussion
Silver, bismuth, molybdenum, tungsten were lower than to detection limits in both parts of sea cucumber. While aluminum, lead and titanium were not found in body wall samples, arsenic and antimony couldn't detected in viscera samples. Silicon was found to be most abundant trace element at the level of 91136,02 µg/kg. Iron and aluminum were highest levels after silicon at the levels of 40008,74 µg/kg and 29703,88 µg/kg respectively (Table 1).

Tab. 1. Elemental composition of sea cucumber body parts

Element	Symbol	Units	Body Wall	Viscera
Silver	Ag	µg/kg	<6,89	<6,89
Aluminum	Al	µg/kg	<0,49	29703,88±3019,67
Arsenic	As	µg/kg	475,98±22,99	<1,38
Boron	B	µg/kg	2726,46±156,30	1178,33±67,78
Bismuth	Bi	µg/kg	<10,43	<10,43
Cadmium	Cd	µg/kg	69,70±6,80	208,50±13,96
Cobalt	Co	µg/kg	20,68±1,90	117,86±6,15
Chromium	Cr	µg/kg	86,76±2,09	285,16±14,89
Copper	Cu	µg/kg	839,69±35,03	963,40±32,41
Iron	Fe	µg/kg	548,20±26,10	40008,74±2247,34
Manganese	Mn	µg/kg	81,74±4,80	1092,78±36,01
Molybdenum	Mo	µg/kg	<7,37	<7,37
Nickel	Ni	µg/kg	56,27±4,22	550,12±8,37
Lead	Pb	µg/kg	<17,00	2115,25±135,66
Platinum	Pt	µg/kg	4,98±0,25	162,51±10,99
Antimony	Sb	µg/kg	17,38±1,49	<6,01
Selenium	Se	µg/kg	306,77±5,93	180,54±11,75
Silicon	Si	µg/kg	9861,49±253,31	91136,12±4789,22
Tin	Sn	µg/kg	554,57±14,29	325,67±11,96
Titanium	Ti	µg/kg	<1,20	1105,40±60,60
Tungsten	W	µg/kg	<10,09	<10,09
Zinc	Zn	µg/kg	2173,60±154,76	5277,24±208,98
Mercury	Hg	µg/kg	175,99±8,06	122,42±4,45
Phosphorous	P	mg/kg	48,75±2,88	202,28±9,40
Sulfur	S	mg/kg	543,48±24,48	540,73±11,45
Sodium	Na	mg/kg	3902,93±78,37	1212,46±69,67
Magnesium	Mg	mg/kg	431,24±13,97	189,26±6,37
Potassium	K	mg/kg	443,64±20,04	80,16±5,20
Calcium	Ca	mg/kg	2807,70±74,74	460,47±29,79

In general, it was observed that viscera of *Holothuria tubulosa* accumulate elements more than body wall. Nearly all detectable trace elements were found higher levels in viscera samples than body wall samples. Main reason of this can be explained with feeding behavior of sea cucumber. Consuming sediment components such as bacteria, microalgae and dead organic matter of plant and animal origin is thought to be major reason of this situation.

Conclusion
Sea cucumbers are good indicator of sea pollution due to their life style and feeding behavior. The element levels given in this study were found to be in normal ranges, however, some of dangerous metals should be closely monitored.

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